EXHIBIT 3

Expert Report of Shanon Phillips

November 18, 2024

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I currently serve as Water Quality Division Director at the Oklahoma Conservation Commission (OCC). I have been with the OCC for twenty-seven years, since June 1997. Before that I was with the Oklahoma Water Resources Board (OWRB) for two years. I graduated from Kansas State University in 1990 with a Bachelor of Science degree in Biology and from Oklahoma State University in 1995 with a Master's Degree in Zoology. My Master's thesis dealt with nutrient limitations in Lake Tenkiller. I collected and tested multiple samples of Lake Tenkiller water.

In my work for the State of Oklahoma I have become intimately familiar with the waters of the Illinois River Watershed (IRW) and Lake Tenkiller. I have taken or supervised the collection of multiple water quality samples in the IRW. I have become familiar with phosphorus levels in the lands and waters of the IRW and with phosphorus behavior on and in the lands and waters of the IRW. I am familiar with the interaction of phosphorus with the soils and plants of the watershed, and the biological effects of phosphorus in the waters of the watershed. I understand the mechanics of phosphorus transport in the lands and waters of the IRW, including the retention of large amounts of legacy phosphorus in the soils of Arkansas and Oklahoma. This legacy phosphorus will continue to leach into the waters of the IRW and will be transported into those waters by soil erosion for many years to come.

Additionally, in my work with the OCC, I have planned and helped implement multiple projects and programs to address nonpoint source pollution in the IRW. In these projects, my team worked with landowners and land managers who voluntarily installed conservation practices which my team helped design and fund. My team then collected water samples to evaluate the effects of the conservation practices installed.

I am familiar with the use of watershed models, particularly the SWAT model and regularly use them in my work. I am also familiar with the use of satellite photography of the Earth's terrain with Google maps and other programs and routinely use those methods in my work. I am familiar with publications from the State of Arkansas about the poultry, poultry waste production and the use and disposition of poultry waste. The opinions I will offer are based on my education, training, and experience, and are held to a reasonable degree of scientific certainty.

I am receiving no compensation for my testimony beyond my usual salary and benefits as a State employee. These are in no way dependent on my testimony in this case.

In the past four years, I have not testified at trial or by deposition.

A copy of my resume is attached to this Report.

SUMMARY OF OPINIONS

Since the conclusion of the trial in this matter in 2010 Defendants' growers in the IRW have continued to land apply large quantities of poultry waste on the surface of the ground of the IRW in both Arkansas and Oklahoma.

In recent years, poultry growers in the IRW have built many large chicken house complexes visible using Google Earth and satellite imagery. This indicates that Defendants have continued their growing operations in the IRW to the present time. Since 2010 at least 547 new houses have been built in the IRW. Of the 140 new houses built in Oklahoma, 123 or 88% are contracted with the defendants in this case.

Since the conclusion of the trial in this matter in 2010 the land and waters of the IRW have remained polluted by phosphorus and several stretches of the streams and rivers of the IRW are listed by the EPA on its 303d list of polluted waters. Moreover, the pollution of the waters of the IRW are widely above Oklahoma's 0.037 mg/L concentration for Scenic Rivers. The legacy phosphorus in the lands of the IRW will continue to make its way into the waters of the IRW for many years to come causing them to remain polluted.

The SWAT model developed by the State with the assistance of personnel from Texas A&M is reliable and is widely accepted. I have participated in its development, which was developed separate and apart from this litigation, and its use in the IRW. One of its uses is to assist the State with trying to bring 303d listed waters back into compliance with EPA standards.

I have heard claims that the Defendants in Arkansas have moved large amounts of poultry waste from the IRW. It is possible to calculate the approximate numbers of large trucks necessary to move such great quantities of waste. I have seen no evidence of the sort of very large-scale efforts that would be required to remove this volume of waste, and have no knowledge of reports of such efforts from eyewitnesses.

The only way to eliminate the phosphorus pollution of Oklahoma's waters in the IRW is to end land application of poultry waste in the IRW and to institute measures such as buffer strips to limit transport of legacy phosphorus into the waters of the IRW. This process will take a long time to correct the water quality problems they have been caused by Defendants decade-long pollution practices.

I. MAJOR FINDINGS OF THE COURT REMAIN UNCHANGED

FOF 287. Nonpoint source contributions of phosphorus loading to the rivers and streams of the IRW and to Lake Tenkiller are greater than point source contributions.

Nonpoint source contributions of phosphorus pollution in the Illinois River and Lake Tenkiller remain significantly higher than point sources, just as they were greater during the 2009-2010 trial. Since that time, nonpoint source contributions have become an even greater percentage of the overall phosphorus loading to the IRW. There are multiple lines of evidence to support this finding comparing historical to current calculations.

1. From the earliest days of modeling phosphorus load allocations in the Illinois River, estimates have consistently recognized that nonpoint source loading contributed a greater percentage of total phosphorus than point source loading and that has not changed. Examples of this include:
    a. Storm et. al (1996) used a Soil and Water Assessment Tool (SWAT) model to estimate that point source loading was 93,000 kilograms phosphorus per year (kg P/yr) or 32% of a total loading to Lake Tenkiller of 292,000 kg/yr.
    b. Storm et. al (2006) updated his SWAT model and estimated that point source phosphorus loading increased to 122,738 kg/yr (250,591 pounds per year (lbs/yr)) versus of 330,000 kg P/yr (727,525 pounds phosphorus per year (lbs P/yr)) or 37% of loading to Lake Tenkiller.
    c. Storm et. al (2010) again used SWAT to estimate that point source loading contributed an average of 82,470 kg P/yr of the total load to Lake Tenkiller of 206,175 kg P/yr or 40% on average between 1990 and 2006.
    d. Michael Baker Jr. Inc., AquaTerra, Consultants and Dynamic Solutions (2017) used a Hydrological Simulation Program-Fortran (HSPF) model to compare point source and nonpoint source loading and found at the

state line, where the annual total phosphorus (TP) load was estimated to be 356,000 pounds (161,479 kg) per year, of which point source loadings were estimated to contribute 30% of the TP load. The model estimated that urbanized areas contributed less than 2-4% of phosphorus load. Although states, tribes and partners found multiple lines of fault with this report, their criticisms did not include that this report under-represented the percentage of point source contributions.

e. Michael Baker Int. (2023) updated their HSPF model to include more recent water quality data as well as changes to point sources and estimated that complete removal of point source discharges from the watershed would increase average concentrations at the state line and Tahlequah stations. Again, although the EPA-assembled technical working group with members from both Oklahoma and Arkansas and the Cherokee Nation were not satisfied that this model update was the best representation of the watershed conditions and responses, the technical working group did not find that the model incorrectly represented the relative contribution of nonpoint source to point source loading.

f. 2024 Arkansas IRW Management Plan Update- SWAT modeling data presented by FTN Associates at public meetings June 25-26 presented highest total phosphorus contributions from subwatersheds with hay and pasture as predominant land use rather than urban areas where point source dischargers are located. (Olsson FTN 2024)

g. 2024 OCC/TX A&M/OSU HAWQs model (SWAT-derived) developed to support updates to the Oklahoma IRW Based Plan also presented urban landuse at approximately 5% of the TP load) (Rogers et. al. 2024). The model estimates that average point source loading in 2020 was about half what it was in 2007/2008. This decrease began in 2009/2010 which coincided with when the Northwest Arkansas Conservation Authority plant went online in 2010.

2. Trends in measured concentration and loading data also support that nonpoint source loading greatly outpaces point source loading. The U.S. Geological Survey, OWRB, and Arkansas Water Resources Center monitor multiple sites on scenic rivers in Oklahoma along with corresponding streams in Arkansas and compare and present results excluding high flow data at the Arkansas/Oklahoma Arkansas River Compact Commission annual meetings and in annual reports. Those reports consistently indicate that years with higher annual flow rates generally have significantly higher total loading and higher average concentrations than years with lower annual flow rates (Arkansas Department of Agriculture Natural Resources Division (ADANRD) 2024 and OWRB, 2024). Using the same data, but including high flow samples, OWRB also documented that phosphorus loading substantially increased with runoff. For example, at the Illinois River near Watts, the 11 years with average flows that were at least 1.25 times higher than the average of 728 cubic feet per second (cfs) contributed 1.4 times more phosphorus loading than the 22 years since 1990 with average annual flows less than 1.25 times the average. Comparing the same 11 higher flow years, average concentration was 1.39 mg/L while the 22 lower flow years averaged 0.084 mg/L. If point sources contributed a higher percentage than nonpoint source, then higher runoff values would tend to dilute concentrations than substantially increasing them.

FOF 288. Nonpoint source phosphorus is a significant source of the phosphorus causing injury to the rivers and streams of the IRW and to Lake Tenkiller.

Nonpoint source derived phosphorus continues to be a significant source of phosphorus that negatively impacts waterbodies in the IRW and Lake Tenkiller. Evidence to support this includes:

1. The most currently approved EPA Oklahoma 303(d) list (Table 1) recognizes 9 segments in the basin (Flint Creek (2 segments), Illinois River (4 segments), Barren Fork Creek (1 segment) and Lake Tenkiller (2 segments)) that do not meet the water quality standards for phosphorus. (Oklahoma

Department of Environmental Quality 2022). No segments have been delisted for phosphorus in the IRW. Additional segments are listed in the IRW for parameters which are frequently associated with eutrophication (sulfate, chlorophyll-a, low dissolved oxygen).

Table 1. 303(d) listed streams in the Illinois River Basin (ODEQ, 2022 and ADA-NRD 2024.

State	WBID #	Stream Name	Impairment
Arkansas	11110103-018	Illinois River	Turbidity (draft)
	11110103-020	Illinois River	Chloride, sulfate
	11110103-024	Illinois River	Chloride, sulfate
	11110103-028	Illinois River	Pathogens
	11110103-026	Moore’s Creek	Sulfate
	11110103-027	Muddy Fork Illinois River	Sulfate, pathogens
	11110103-4080	Lake Fayetteville	pH
	11110103-630	Little Osage Creek	Pathogens
	11110103-933	Little Osage Creek	Pathogens
	11110103-813	Barren Fork	Dissolved oxygen (DO) (draft)
	11110103-932	Sager Creek	Ammonia
	11110103-733	Unnamed tributary to Brush Creek	DO
Oklahoma	OK121700020020_00	Tenkiller Ferry Lake	DO, **phosphorus**, mercury
	OK121700020110_00	Chicken Creek	Fish
	OK121700020180_00	Elk Creek	DO
	OK121700020220_00	Tenkiller Ferry Lake, Illinois River Arm	**Phosphorus**, chlorophyll-a, mercury
	OK121700020270_00	Park Hill Branch	Benthic Macroinvertebrates
	OK121700030010_00	Illinois River	**Phosphorus**, *Enterococcus*
	OK121700030020_00	Tahlequah Creek (Town Branch)	*Enterococcus, Escherichia coli*
	OK121700030030_00	Stick Ross Creek (Ross Branch)	Benthic Macroinvertebrates
	OK121700030040_00	Tahlequah Creek (Town Branch)	Escherichia coli
	OK121700030080_00	Illinois River	**Phosphorus**, *Enterococcus*
	OK121700030090_00	Pumpkin Hollow Creek	DO, Benthic Macroinvertebrates
	OK121700030110_00	Cedar Hollow Creek	Benthic Macroinvertebrates, fish
	OK121700030280_00	Illinois River	*Escherichia coli*, turbidity,

			Enterococcus, **Phosphorus**
	OK121700030290_00	Flint Creek	**Phosphorus**, DO
	OK121700030350_00	Illinois River	**Phosphorus**, *Enterococcus*. *E coli*
	OK121700040010_00	Caney Creek	*Enterococcus, Escherichia coli,* Benthic Macroinvertebrates
	OK121700050010_00	Barren Fork	**Phosphorus**
	OK121700050070_00	Wall Trip Branch	Benthic Macroinvertebrates
	OK121700050090_00	Tyner Creek	DO
	OK121700060010_00	Flint Creek	**Phosphorus**
	OK121700060080_00	Sager Creek	Benthic Macroinvertebrates, sedimentation, *Enterococcus*

2. In addition, the EPA added 7 segments (Illinois River (AR_11110103_020, AR_11110103_024), Osage Creek (AR_11110103_730, AR_11110103_830, AR_11110103_030, AR_11110103_930), and Spring Creek (AR_11110103_931) in the Illinois River basin as impaired for phosphorus before approving the Arkansas 2020 Integrated Report citing that Arkansas failed to apply its narrative nutrient criteria. (EPA 2023) These EPA listings added 5 streams not previously listed to Arkansas' 12 listed segments (based on Olsson-FTN 2024).

3. OWRB's Beneficial Use Monitoring Program data from 2016-2017 in Lake Tenkiller continues to recognize a trophic state index in the Eutrophic to Hypereutrophic range with low dissolved oxygen concentrations during stratified periods where greater than 70% of the water column lacks sufficient oxygen to support aquatic life. This data was used to support continued listing of Lake Tenkiller on the 303(d) list. (ODEQ 2022)

4. Arkansas River Compact Commission reports from both states compare measured concentrations to water quality standards and clarify that segments fail to meet Oklahoma's numeric criteria for phosphorus (ADA-NRD 2024 and OWRB 2024).

II. POULTRY PRODUCTION IN THE IRW SINCE 2010

Since 2010, poultry production in the IRW has increased both in terms of numbers of houses in operation and estimated birds produced (production has also increased in nearby watersheds which may also be sources of poultry waste land applied in the IRW). When the Oklahoma HAWQs modeling team utilized the poultry waste application data provided by the Arkansas Department of Agriculture Natural Resources Division (ADA-NRD) and Oklahoma Department of Agriculture, Food and Forestry (ODAFF) in late 2022, the team found these data sufficient for some purposes and flawed for other purposes. While this was the same data utilized in both the EPA-funded HSPF models and the ADA-NRD SWAT model), the modelers had to make additional estimates to achieve a satisfactory model.

The OCC team sought ways to better estimate poultry waste production and application in the IRW than the readily available but inadequate sources. Although we had ODAFF records of registered poultry growers in the Oklahoma portion of the watershed from 2018, these records were dated. Arkansas data was county-wide and proportioned to the watershed by percent of the county in the watershed rather than actual number of birds or poultry waste produced or applied in the watershed. Therefore, we decided to update the ODAFF data and incorporate the Arkansas portion of the watershed and then use this information to estimate poultry waste produced in the watershed. We decided to examine the location and number of chicken houses in the watershed.

To begin this task, using ARCGIS software, I overlaid the 2018 data from ODAFF of active poultry facilities on an updated aerial image of the IRW. I could see that there were facilities active in 2018 that seemed to be out of operation compared to facilities existing in 2022. There were also facilities existing in 2022 that had been constructed after 2018. Most facilities which were active in 2018, however, remained active in 2022. When I compared the same ARCGIS imagery to Google Earth Pro imagery of the same location and then used the historical imagery

feature on Google Earth Pro, I could step back through available historic photos to determine a “built-by” time frame of the new facilities. This process made it possible not to just update some features of the ODAFF data with new or out of business houses, but also to estimate where houses were in Arkansas, and that information could be used to help attribute their reported county wide data to specific regions of the watershed.

To assist in the process described below I assigned the colored dots displayed on the Google Earth Pro photos to represent the approximate date each structure was built. A table of these dates appears on Figure 11 below, as does my estimation of whether buildings in each time period were still operational. This table is summarized in the map of the IRW showing the poultry houses (Figure 11) and the approximate time they came online.

Below are the steps/process that I used to identify locations and the number of houses that were actively producing birds in the IRW during the 2022 timeframe:

1. I began with AEMS_PFO12.18. ARCGIS Layer which was provided to OCC by ODAFF (Figure 1). This layer included information on Poultry Operation ID, Owner & Company Name, Integrator, address, phone number, inspector, total # of birds, # of houses, and year of registration. This layer also included farms for all of Oklahoma.

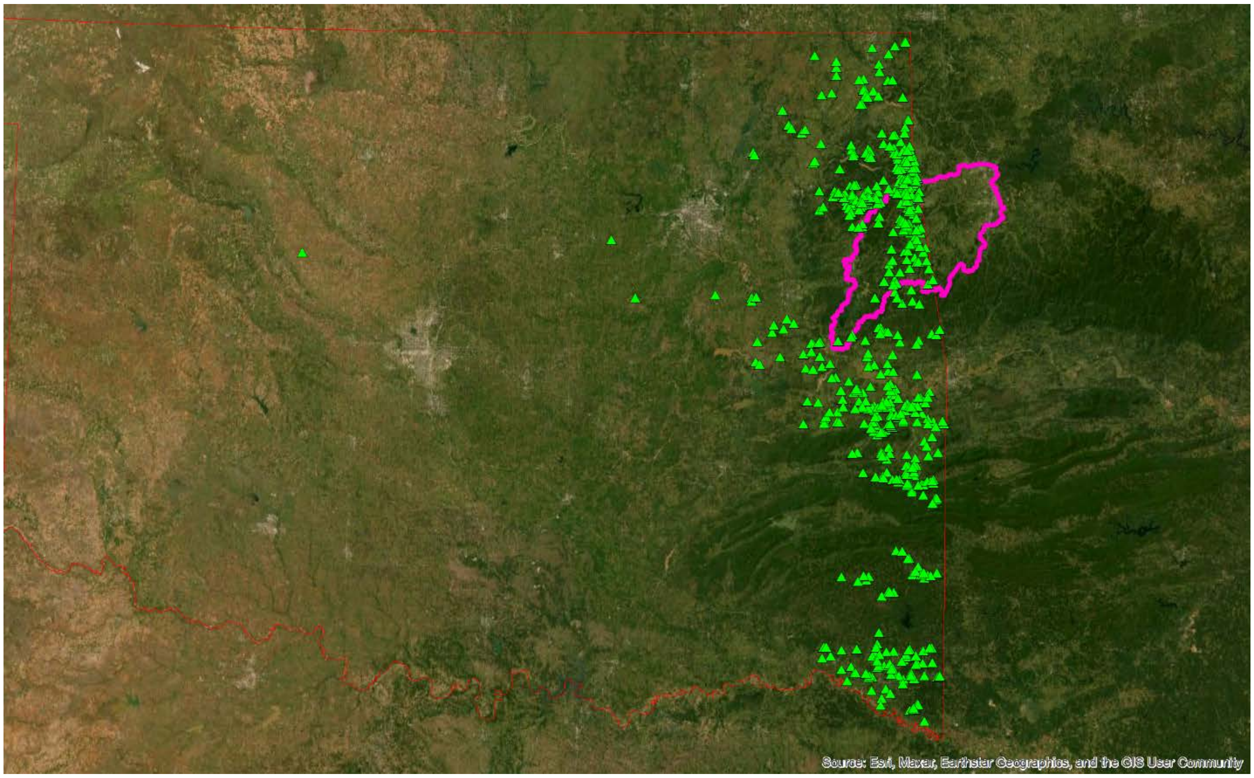


Figure 1. ArcGIS Image showing 2018 ODAFF registered poultry feeding operations.

2. I recognized limitations of this data in terms of potentially representing poultry waste production in the watershed which included, at a minimum, no information about Arkansas production and which existing information had not been updated after 2018.

3. For OK SWAT/OKHAWQS model, I extrapolated poultry waste application from estimates of numbers of birds produced in 2022. First, I focused on 2018 location data to pinpoint house locations active in 2018 from the ODAFF ArcGIS layer (Figure 2).

Figure 2. Active PFOs from ODAFF 2018 ArcGIS layer.

4. Then I used Google Earth Pro to find the same location (Figure 3):

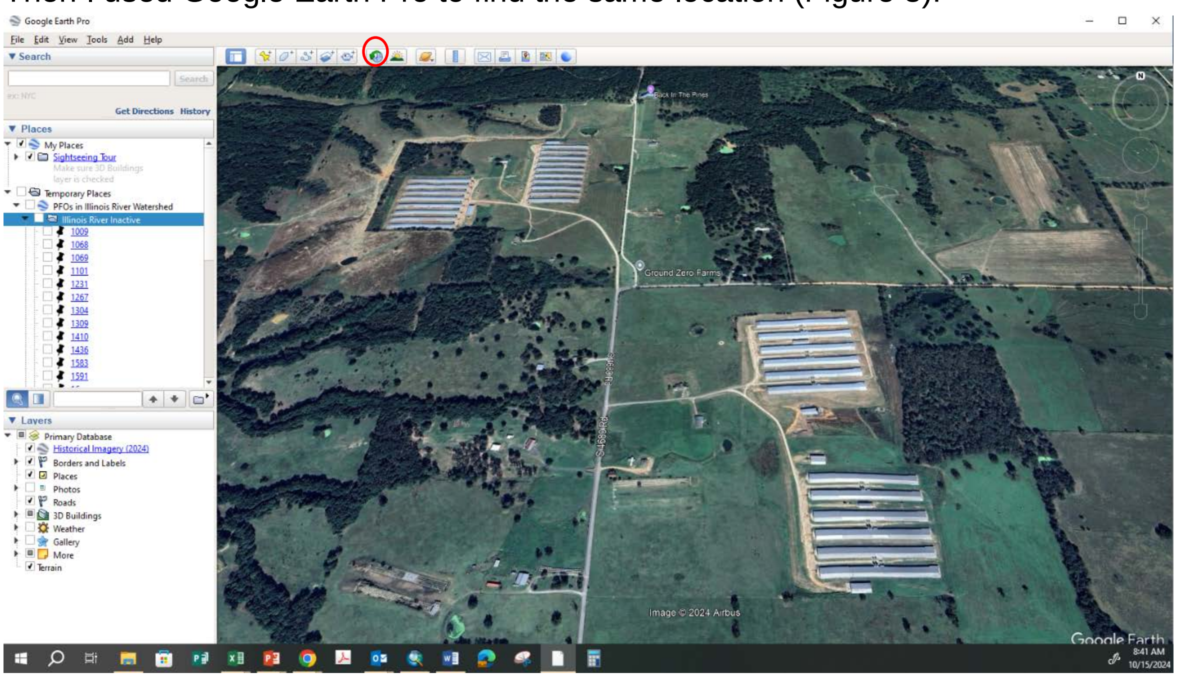


Figure 3. Google Earth Pro image of approximate same location shown in Figure 2.

5. Google Earth Pro has a feature that allows you to reference historical aerial imagery going back at least to 1995. Using this historical image tool in Google Earth Pro (clock-like button in the upper left, circled in red), I could scale back in time to see when complexes were built. 1985 is the earliest imagery available but has generally low resolution so it is often not possible to clearly see houses. By 1995, higher resolution imagery is generally available; therefore, if houses are present in the 1995 images, their built time was labelled as pre-1995. Figure 4 shows at least 3 complexes in existence in 1995, only 1 of which seems to be currently active, the 18-house complex in the upper left. The smaller 12 house complex on the upper right is characteristic of hog operations from the watershed in that timeframe and indeed, OCC has historic GIS data of animal production operations in the watershed from 1997 that labels it as such. Therefore, that 12 house complex (or similar complexes) was not counted as a poultry feeding operation. The two smaller 2 house complexes that are in various stages of tear-down are marked as pre-1995 and although it is noted that there were, at some point, 2 houses in those locations, these operations were not in production in 2022 so they were labelled as not active. The ArcGIS map (Figure 5) below has markers (dots) that either associate the ODAFF data points with a construction timeline or add new data points for facilities that were either constructed either after the 2018 data set was produced or were constructed prior, but not in operation in 2018. Warmer colored markers indicate facilities estimated to be in production in 2022 while cooler toned markers indicate those not in production in 2022.

Figure 4. Google Earth Pro Image from March 1995 showing locations of 1 active poultry facility and 2 relic facilities plus one hog production facility.

Figure 5. ArcGIS image of same area as figure 4, with warm toned dots indicated facilities in operation in 2022 and cooler toned (small square) markers indicating facilities estimated to be not in production in 2022.

6. Moving through the entire IRW frame by frame in ArcGIS and corresponding Google Earth Pro frames, then using the historical imagery from Google Earth Pro, I could estimate building dates for complexes. From the ODAFF data, I had some build dates to use for verification which usually corresponded with the satellite data, although not always. Sometimes, the build date in ODAFF records was slightly before or slightly after the houses show up on the satellite image, perhaps due to permitting. For the Arkansas portion of the watershed, I had to rely on Google Earth Pro images to estimate construction timeframes. I also noted the number of houses in each complex. For Oklahoma, this was part of the original dataset provided by ODAFF, but I updated or amended this informationwhen I did the Google Earth Pro comparisons.

7. The next necessary step was to estimate whether houses were actively producing birds in 2022. I compared what complexes with active licenses from 2018 ODAFF records looked like in 2018 imagery compared to those without active licenses and determined that in some cases, although not frequently, although an active license was indicated, houses appeared to have been demolished or otherwise in extreme disrepair, or in other cases, no nearby complexes were associated with the ODAFF geo-referenced license information. While there appeared to be a few complexes that were constructed pre-1995 which still had active licenses from ODAFF, many of those facilities were no longer being used. An example of this includes the complex in the upper left of the previous photos (Figures 2-5), which still had an active license and patterns of traffic. However, in other cases, even large complexes constructed in that time frame or slightly later were no longer producing in 2022 as evidenced by missing houses or in houses in obvious disrepair (see ArcGIS image below- (Figure 6)).

Figure 6. Complex constructed pre-1995 no longer active in 2022.

8. In other cases, activity wasn't as clear. It was necessary to estimate whether production was active in 2022 based on several observations. First, did vegetation remain cleared from around the poultry house sites? Second, was it clear that there were traffic patterns around the houses; were dirt/gravel roads to and from the houses free from vegetation? Third, were there visible fans and feed bunkers at each house? Fourth, was at least the front of the house maintained so there was a clear "landing" pad that indicated it had regular entry and exit occurring? Fifth was metal on the houses in good condition (i.e. not rusting)? If these conditions were met, then houses were estimated to be active, as long as they were built within the last 20 years. However, for older houses, extra care was given to ensure that patterns of use were similar for all houses in the complex and that upgrades were visible. In other words, it is recognized that some older houses are still in use for something other than poultry production (Figure 7).

An example are the three houses below which were constructed prior to 1995). In this case there was an active license for this complex in 2018, clear traffic patterns exist which are consistent to all three houses, feed bins are visible, and the metal seems to be in good repair so this facility would be noted as active.

Figure 7. Poultry Feeding Operation labelled active by ODAFF records in 2018. Displays traffic patterns at the front of houses, vegetation generally cleared around houses, feed bins and overall house maintenance that are consistent with active production.

9. Whereas a similar farm, built during a slightly later timeframe (2008) seen in the ArcGIS image (Figure 8) below was estimated to not be currently in production due to lack of traffic patterns around the houses (access roads don’t show clear traffic use), houses are in a state of disrepair, and houses seem to lack notable upgrades like concrete/gravel entrance pads and feed bins. ODAFF records from 2018 seem to indicate this farm was still in production at that time, however, patterns of use seem to shift between 2017 images (Google Earth Pro Figure 9) and 2022 (Google Earth Pro Figure 10),

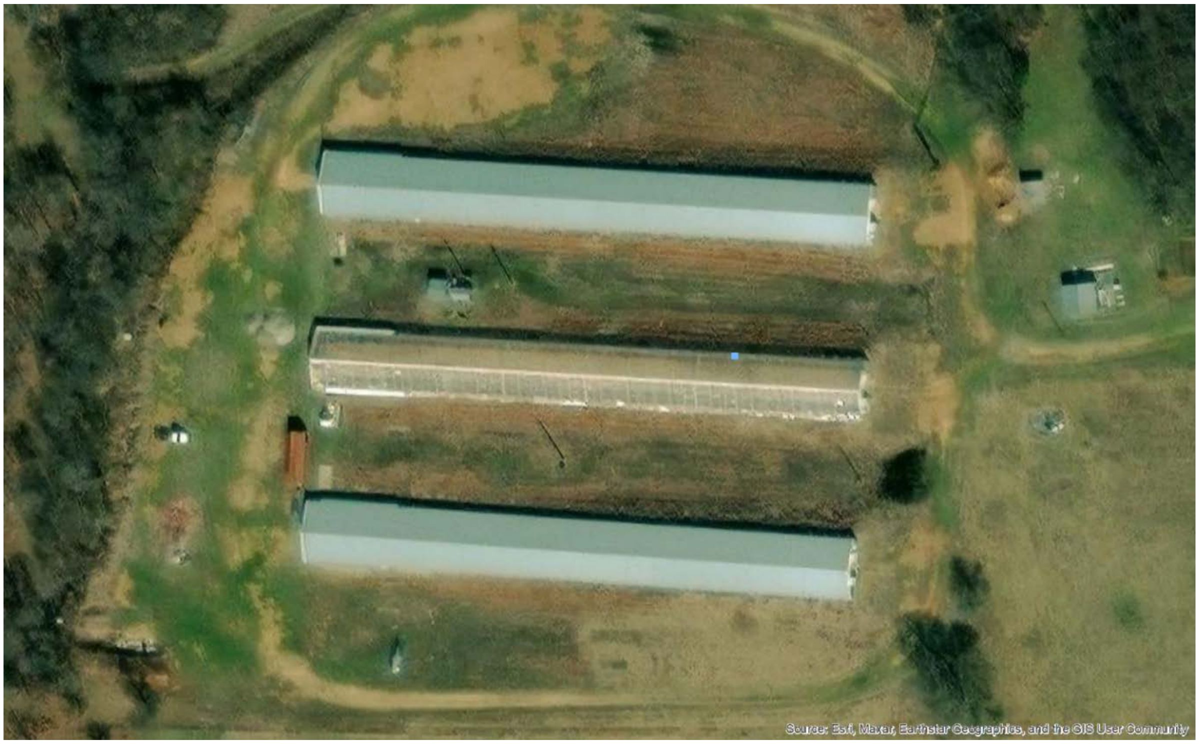


Figure 8. 2008 Poultry Feeding Operation showing disrepair, reduced traffic and missing upgrades from 2022 images suggest that even though 2018 ODAFF license info said operation was active, it has since then ceased operation. Therefore, it was labelled as inactive.

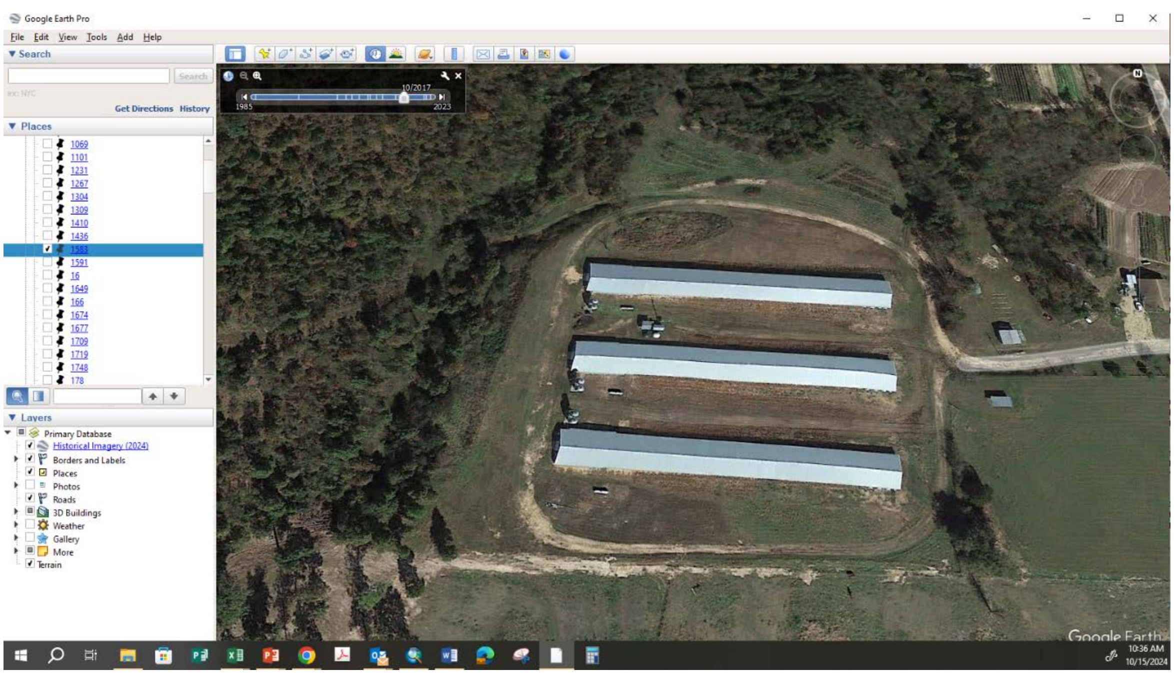


Figure 9. Google Earth Pro image of same facility from 2017 suggest patterns of activity and overall farm maintenance that suggest the operation was in active production.

Figure 10. The next Google Earth Pro time-step image is from 2022 and damage to the middle structure, removal of some related nearby equipment and reduced traffic patterns suggest the facility was no longer in production.

so the facility was estimated to not be active in 2022. This information was later confirmed in 2024 with updated data from ODAFF that suggested the facility license went inactive in October 2019.

10. Using this process, frame by frame, I updated the 2018 ArcGIS layer created with ODAFF license information to add any additional facility or remnant of a facility in the IRW which was not included on the ODAFF data, either because it was no longer in operation when the 2018 data was produced or had been constructed after 2018 in Oklahoma. I replicated the same process in Arkansas. For facilities where I lacked ODAFF data, I could estimate a build date range, the number of houses, and whether or not they were estimated to be in active production in 2022. If I had ODAFF data, I also had data on the per flock bird capacity of the facility.

In addition, later in 2024, as OCC prepped for the fourth Stakeholder Meeting for the Watershed Plan updates, we were able to obtain an updated GIS

layer of active production sites from ODAFF and this was used to determine whether estimates of activity in 2022 were accurate. The accuracy rate for estimating current activity in Oklahoma operations was >98%.

11. The compiled information was then shared with the SWAT/OKHAWQS modeling team at TX A&M University and used by the team to estimate poultry waste production and land application in the IRW. Texas A&M used the built-by time frames and number of houses per complex to compare to Oklahoma figures on bird capacity per house and to estimate the number of birds likely grown at each farm (Figure 11).

12. Finally, during a review of differences between the Arkansas SWAT model and OK HAWQs/SWAT model, comparisons were made between the poultry waste production estimates used by the Oklahoma and Arkansas modeling teams. These comparisons were presented to the Arkansas modeling team and shared with some Oklahoma peer agencies for review but not made public to stakeholders. Although the Oklahoma model estimated a larger number of birds produced in the total watershed (234,557,040 per year in the total watershed, 181,530,000 of which were in Arkansas compared to the much smaller Arkansas estimate of 12,060,541 per year in Arkansas), the Oklahoma model estimated a much smaller amount of poultry waste generated (255,120 in the total watershed on average per year versus the Arkansas (ADA-NRD reported) estimate of 798,515 tons generated just in the Arkansas portion of the watershed). ODAFF poultry waste production in the Oklahoma portion of the watershed between 2015 and 2023 ranged between 21,000 and 72,000 tons, which suggests that the OK HAWQs estimate is reasonable (ODAFF 2024).

Although the specific methodology that OK HAWQs used to estimate poultry waste production amounts was not presented in detail at the stakeholder meetings, maps of facilities and information about rates of poultry waste application were presented and no questions or concerns were raised about the accuracy of the information. My examination of the Google Earth Pro

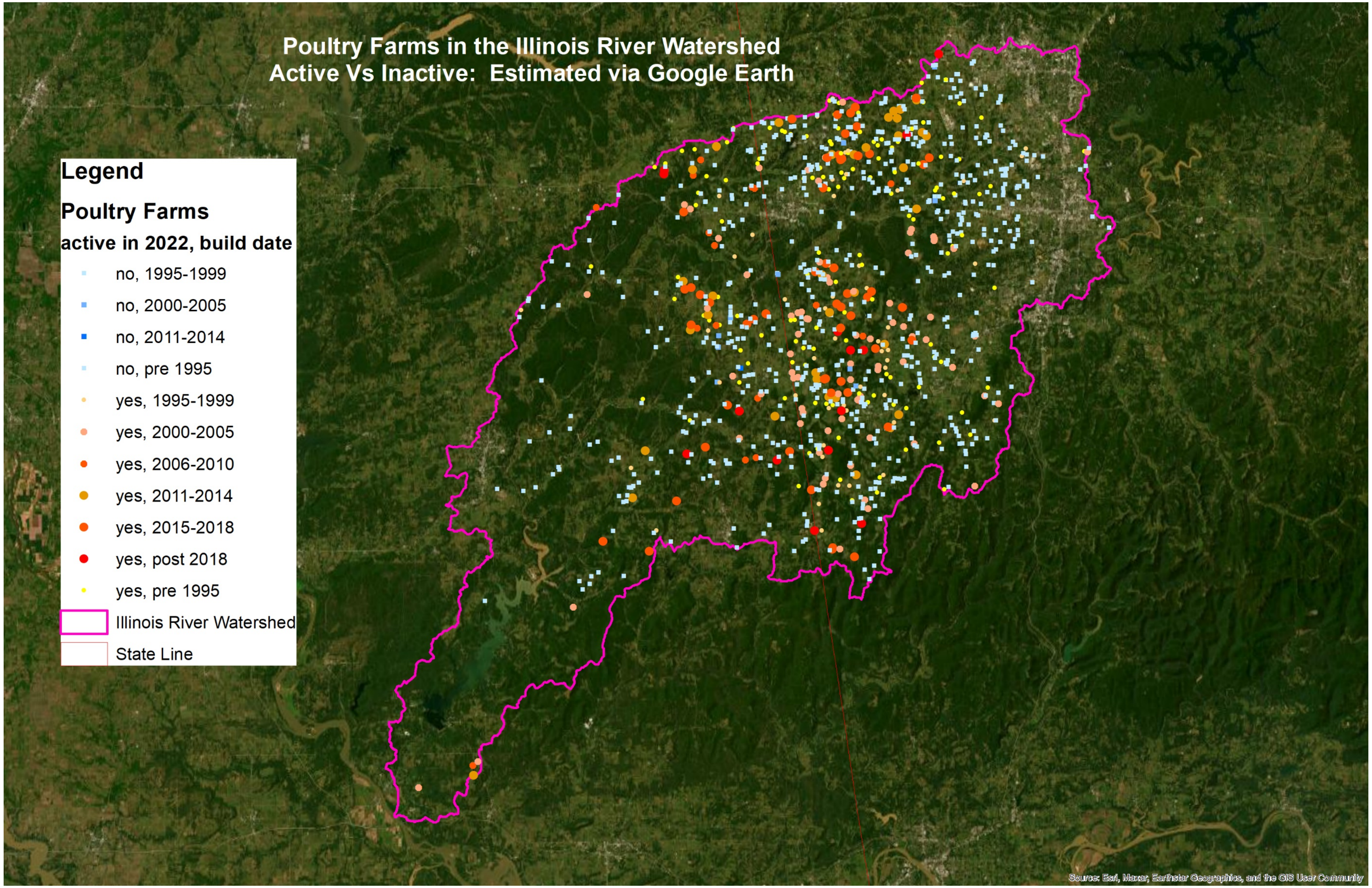


Figure 11. Location, build-date range, and estimation of whether in active production in 2022. Produced by Shanon Phillips, OCC, 2022.

pictures indicates that in 2022 there were approximately 1,799 working poultry houses in the IRW in 2022.

Bird production and poultry waste management have changed since the initial trial hearings. Current estimates indicate significantly more birds are produced in the IRW but less poultry waste per bird is produced. A likely explanation for this is that for certain types of production, growers are more likely to wind-row and compost waste in-house and do full cleanouts less frequently than historically. This means a grower who used to do a full cleanout annually may now be able to go 18-24 months or in some cases even longer. However, in general, they are still raising the same number of birds. In cases where they have shifted from smaller to larger birds, the larger birds will produce a larger amount of manure compared to a smaller bird. Although composting in house allows growers to clean out less frequently which potentially results in lower poultry waste volume, phosphorus concentrations would then be increased per ton of poultry waste produced. Numerous references in the literature suggest that nutrient content varies considerably in poultry waste based on clean-out frequency and many other factors (Ritz 2009, Tabler et al). Fresher broiler waste tends to have a nitrogen to phosphorus ratio of about 1.14 while stockpiled or composted broiler waste is closer to 0.93 – 0.98. Fresh layer and breeder waste has an even lower nitrogen to phosphorus ratio ranging from 0.67 – 0.72 (Ritz 2009). Some of the newer facilities in the Oklahoma portion of the IRW are breeder or layer operations, which means the waste has lower nitrogen to phosphorus ratio, which is less cost-effective to move from the watershed.

III. NOT ALL POULTRY WASTE PRODUCED IN THE IRW IS BEING REMOVED FROM THE IRW.

Although it is not known exactly how much poultry waste produced in the IRW is exported outside the watershed, multiple indicators suggest that it is not all

exported outside the watershed. Also, it seems likely that some poultry waste produced in the Eucha/Spavinaw watershed, where poultry waste management is the most regulated in either state, is moving south into the IRW. Information to support this reasoning includes:

1. Questions arising from review of Arkansas poultry waste production/application reports provided by ADA-NRD that indicate > 100% of poultry waste produced in a county is exported suggest that this data is either incomplete or inaccurate. How can more poultry waste be exported from a county than is produced there unless some duplications/breakdowns in tracking production and movement exist? This same data represents poultry waste produced, poultry waste exported (reported as removed) and poultry waste applied. However, poultry waste applied plus poultry waste exported does not equal poultry waste produced. Does poultry waste removed mean removed from the farm or exported from the watershed. Also, anecdotal claims have been made at various meetings I have attended that claimed at least 80% of poultry waste produced was being exported from the watershed. Also, the annual poultry waste reports produced by ADA-NRD summarize combined Benton and Washington county poultry waste from 2014 to 2019 at 11,577,493.86 tons of waste produced (not all of which is in the watershed but would still require the same infrastructure to remove). This produced total is less than the 11,854,394 tons of waste reported as being removed from those counties which also raises questions about the accuracy of the summary. If one estimates that the type of poultry waste trucks which move poultry waste long distances generally haul an average of 26 tons at one time, the total reported as being removed would require 455,938 truckloads, which is average of 312 truckloads per day, 365 days per year over the four years this data represents. Recognizing that this doesn't include poultry waste produced in Oklahoma, but that some of the same equipment and infrastructure would be utilized, this seems highly unlikely.

2. First-hand accounts from poultry growers who speak about the challenges they have in coordinating poultry waste removal from their operations, citing a reduced number of available haulers, some of which seem to work more locally within specific watersheds/counties while others travel from as far away as Missouri.

3. I used a simple exercise to estimate a best-case scenario for time of travel from individual active (according to ODAFF registrations) poultry house locations in the Oklahoma portion of the IRW to closest pasture or cropland fields outside of the watershed using Google maps. Due to the Eucha/Spavinaw settlement requirements, I assumed that poultry waste would not move into that watershed from the Illinois River and instead found the closest field outside of that watershed for Illinois River poultry facilities in the northern portion of the IRW. I did not intend for this to be a completely realistic estimate because I mapped poultry waste movement from each of the active poultry farms in the watershed to one of 13 fields closest to the watershed boundary on the quickest route. This comparison indicated that trucks needed to travel between 0.5 and 24.5 miles (one way) with an average of 11.7 miles (one way) to transport poultry waste to the closest field outside of the watershed (Figure 12). This meant that travel time ranged from 5 – 32 minutes, one way, with an average of 17 minutes one way. Next, I estimated bird production based on type of birds produced, average number of flocks produced per type of bird grown, and house capacity (I assumed a 10% reduction from ODAFF capacity ratings to account for mortality or other reasons houses would not operate at capacity). I then used literature values for amount of poultry waste produced per bird type (ranging from 1.5 – 26 tons poultry waste/1000 birds) to estimate total amount of poultry waste produced. I then divided those numbers by 26 to get the number of truckloads necessary to haul it (a conservative estimate because some truck types may only haul 6 to 18 tons. I multiplied the number of truckloads by the time to haul out and back to the farm location and added 30 minutes to load and unload, in order to estimate how much time it would take for those

trucks to move the poultry waste. The results ranged from 196 ten-hour days – 447- ten-hour days per year to haul poultry waste produced in the Oklahoma portion of the watershed to the closest possible spots outside the watershed. Given that this was just the Oklahoma numbers for the watershed, it seems difficult to achieve when extrapolated to the entire watershed.

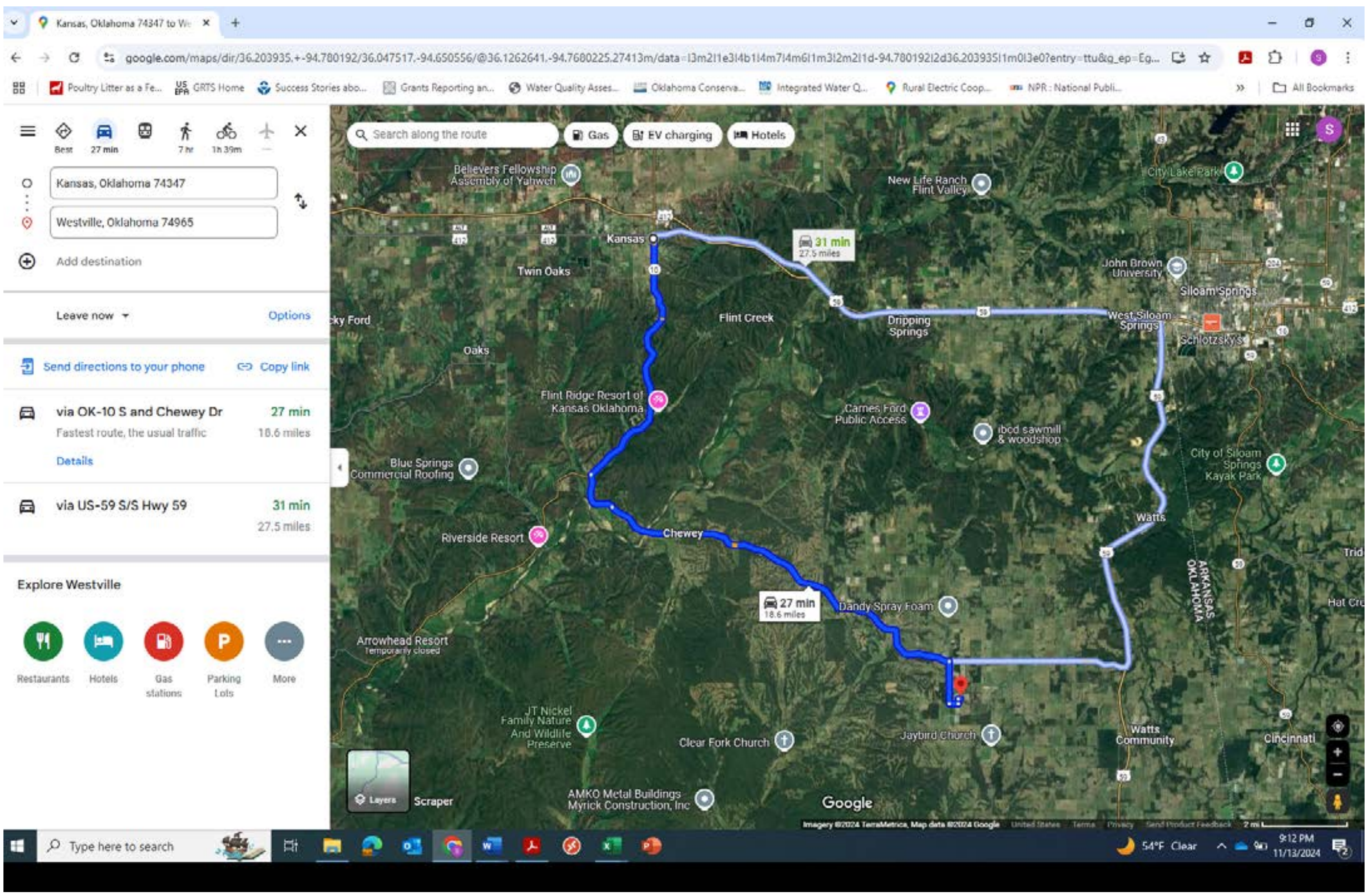


Figure 12. Screen shot example of Google Maps method to estimate time and distance to travel from poultry farm locations in the IRW to closest pasture or cropland field outside watershed.

4. Between 2005 and 2010, OCC supported multiple projects to incentivize poultry waste transport in partnership with conservation districts and in some cases, with ADA-NRD and the Poultry Company supported nonprofit, BMPs, Inc. Although there were slight differences in the payment mechanism of these programs (some paid haulers and buyers while others reimbursed

buyers and growers), they all used a similar framework to incentivize poultry waste moving out of the IRW (or other nutrient-impaired watershed) to be land-applied in non-nutrient impacted watersheds. Payment rates for these programs were set based on relative costs per ton per mile of transport, generally reimbursing around $2/mile of transport costs. Within each project, all monies (approximately $300,000 in total) were utilized within 18 months or less. In 2022, OCC launched a similar effort and referenced other ongoing poultry waste transport programs in other parts of the country to ascertain whether the incentives offered were realistic given economics of the time. OCC utilized similar payment rates as a program offered in Louisiana which in turn, were similar to what had been offered in the 2005-2010 programs. However, OCC also offered an additional incentive to growers to sell their poultry waste to buyers outside nutrient impacted watersheds of $2/ton. This payment to growers was estimated to make up the difference between the cost of new bedding and average payments to growers per ton of poultry waste sold, which OCC based on discussions with growers who indicated that it would be welcome. So far, OCC has used about $60,000 of $300,000 available in 2 years. No poultry waste movement has been subsidized outside the IRW through this program. OCC's counterparts in Louisiana are happy with the success of their program which leads us to believe that the funding offered is at least adequate. The program was advertised at nutrient management planning workshops and through conservation districts but has been much less successful than anticipated. This lack of success supports the idea that poultry waste doesn't easily move outside nutrient impacted watersheds in Oklahoma.

5. In my travels to eastern Oklahoma/western Arkansas over the 31 years I have worked on water resource issues in the IRW, I have routinely seen trucks hauling finished birds and grain presumably for feeding. But I rarely, if ever, see poultry waste trucks on major highways or side roads. If finished birds, bedding, and feed can be moved into and out of the watershed, poultry waste can as well, but there should be evidence of it. I have asked multiple

coworkers, some of whom live in the watershed, but all of whom work in eastern Oklahoma whether they see many trucks moving poultry waste and it is my understanding that they all have similar recollections.

IV. PHOSPHORUS CONCENTRATIONS IN THE OKLAHOMA PORTION OF THE IRW AND LAKE TENKILLER REMAIN EXCESSIVE.

Phosphorus concentrations in the IRW remain excessive, and are trending at least level, if not upwards since 2009, as indicated by multiple lines of evidence.

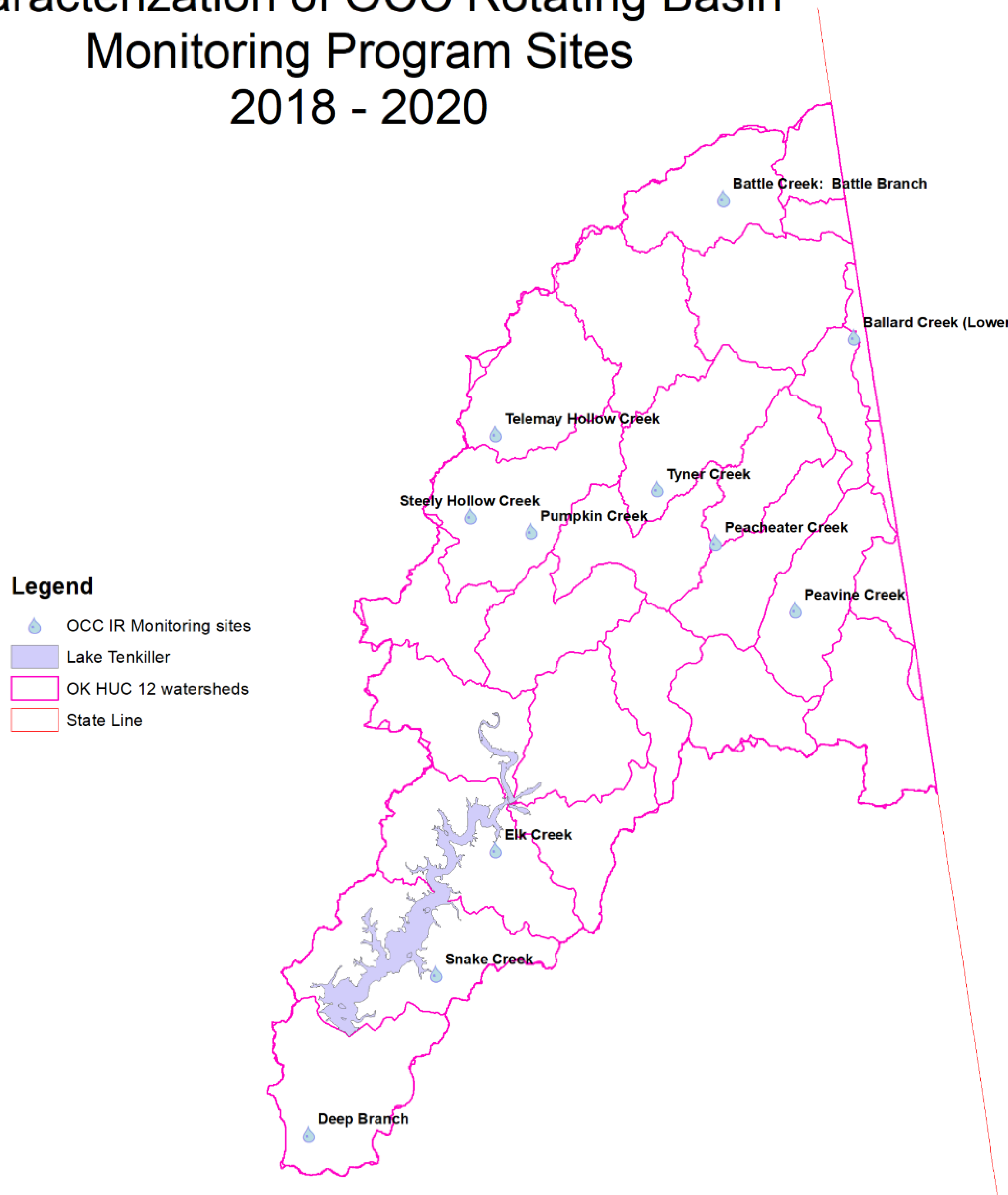
1. The nine waterbody segments which remain listed on Oklahoma's 2022 303(d) list for phosphorus including 2 in Lake Tenkiller (Table1) (from ODEQ 2022) suggest that phosphorus concentrations remain excessive. To date, no waterbody segment has been delisted for phosphorus from the IRW.
2. EPA in 2023 added 7 segments to the Arkansas 303(d) list for phosphorus exceedances based on Arkansas' narrative criteria (EPA 2023).
3. The most recent reports made to the AR/OK Compact Commission depicts loading (excluding high flows) at most stations declining significantly between 1980 and the early 2000s, with further declines slowing until about 2009 and then leveling off until recently, when they are beginning to increase at most stations (OWRB 2024). From an OWRB-completed analysis of the same data sets which include high flows, the bulk of loading is delivered to and transmitted through the system during higher flow years. For example, years like 2015 and 2019 which had period of record high flow events, delivered 44% of the total load for the decade.

V. PHOSPHORUS LEVELS IN SMALL CREEKS AND STREAMS FLOWING THROUGH FORRESTED LAND ARE LOWER THAN THOSE FLOWING THROUGH PASTURE LAND.

Phosphorus sampling results from stations located in smaller subwatersheds contained within the Oklahoma portion of the IRW tell us that phosphorus concentration varies significantly with landuse in the watershed and that

watersheds with more pastureland where poultry waste could be applied have higher phosphorus concentrations than watersheds with more forests and less pasture land (Figure 13). The goal of the OCC Rotating Basin Monitoring Program is to evaluate small streams across the state for impacts from nonpoint source pollution. Monitoring sites are located upstream of major confluences, backwater effects from reservoirs or large rivers, and point sources. EPA and the U.S. Office of Management and Enterprise Services evaluate the EPA Clean Water Act Section 319 Nonpoint Source Pollution Program on its ability to remove waterbody impairments or delist streams from the 303(d) list. Therefore, OCC program goals do not favor either adding streams to the list unnecessarily with limited data or failing to remove them from the list when conditions have improved. The most recent completed Rotating Basin Report which references IRW streams includes the largest number of streams (11) concurrently sampled in the watershed through the program (OCC 2021). Although the 0.037 mg/L water quality criterion does not apply to these segments because they are not designated as scenic rivers, they discharge to scenic rivers and therefore impact the scenic rivers' capacity to achieve water quality standards. The most recent report includes data collected from 2018 to 2020, and documents water quality conditions on tributaries draining to scenic river segments and directly to Lake Tenkiller. Reported average phosphorus concentrations ranged from 0.0149 mg P/L to 0.1068 mg P/L. In general, streams with higher average total phosphorus concentrations had more pasture land and poultry houses in and nearby the subwatersheds than streams with lower average total phosphorus concentrations.

Characterization of OCC Rotating Basin Monitoring Program Sites 2018 - 2020



Site Name	Watershed Size (acres)	2018-2020 Average TP (mg/L)	Watershed Landuse % Forest	Watershed Landuse % Pasture	# active poultry houses
Snake Creek	3,257	0.0121	90.08	7.79	0
Telemay Hollow	1148	0.0149	83.36	10.18	0
Steely Hollow Creek	1,990	0.0174	68.25	24.32	0
Deep Branch Creek	7,304	0.0235	55.11	41.16	4
Pumpkin Creek	12,095	0.0243	79.29	12.54	0
Tyner Creek	26,756	0.0274	61.009	32.84	136
Peavine Creek	7,141	0.0364	42.35	51.87	4
Elk Creek	12,155	0.0383	84.48	13.51	0
Peacheater Creek	16,052	0.0508	46.53	50.16	7
Battle Creek	5,661	0.0718	41.46	56.61	14
Ballard Creek	29,111	0.1068	29.23	65.75	38

Figure 13. Comparisons of Rotating Basin Monitoring Program Site Watersheds in the IRW (2018-2020).

VI. ALGAL SPECIES COMPOSITION CHANGES AND ALGAL BIOMASS INCREASES RESULTING IN UNDESIREABLE AESTHETIC OR WATER QUALITY CONDITIONS IN THE SCENIC RIVERS OF THE IRW AT ABOUT 0.035 MG P/L.

Multiple studies have shown that the 0.035 mg P/L is the critical response total phosphorus level above which one finds a significant shift towards less desirable algal species composition and increase in algal biomass that result in both undesirable aesthetic conditions but can also contribute to greater diurnal shifts in dissolved oxygen including lack of oxygen in the water column and shifts in pH levels which can negatively affect biota. However, the most pertinent study in the Illinois River was the study commissioned by a gubernatorial-appointed committee of representatives from both Oklahoma and Arkansas charged specifically with determining the critical response level for total phosphorus in Scenic Rivers in Oklahoma. This study, the Oklahoma-Arkansas Scenic Rivers Joint Phosphorus Study Final Report (King 2016) sampled streams all over northeastern Oklahoma and northwestern Arkansas, both inside and outside scenic river watersheds and related phosphorus concentration to algal response. As a result of this study, the committee of 6 agreed that the critical response level of 0.035 mg P/L was scientifically valid and appropriate to delineate the threshold above which streams in the basin were more likely to experience negative impacts to the biological community and to aesthetic conditions. It was also determined that this level was close enough to the existing water quality standard (established in 2002) of 0.037 mg P/L and therefore would not require that OWRB change the standard.

VII. THE CIRCUMSTANCES I TESTIFIED TO AT THE ORIGINAL TRIAL STILL APPLY TODAY.

The Court relied on my testimony for several of its findings of fact, including that:

FOF 542. Shanon Phillips, Director of the Water Quality Division at the Oklahoma Conservation Commission, opined, based on her education and experience, and to a reasonable degree of scientific certainty, that nutrients from land-applied poultry waste contribute to nutrient loading of the waters of the IRW, and that poultry waste adversely affects the water quality of the basin. [TR at 1384:2-7; 1384:22-25; 1532:6-9 (Phillips)].

This testimony still holds true today. As it was in 2009-2010, nutrients from land applied poultry waste still contribute significantly to nutrient loading in the basin. In addition to the watershed models which estimated significant loading from land applied poultry waste, the challenges with exporting the volume of poultry waste discussed previously, and the continued high phosphorus loading dominated by nonpoint sources, and additional lines of reasoning further support this:

1. Since 2009, state and federal programs have invested at least $56,000,000 in nonpoint source programs targeting phosphorus reductions in both rural and urban portions of the IRW and, although some water quality improvements have resulted (i.e. delisting streams for *Escherichia coli* and *Entercoccus* bacteria (EPA 2021 and OCC 2021)), monitoring data in the basin does not indicate significant reductions in total phosphorus loading at either base flow or high flow conditions. These voluntary programs have been unable to document decreased total phosphorus loading watershed wide, even with specialized monitoring programs which have been able to document reduced phosphorus concentrations in other watersheds (OCC 2017). Although these projects funded some poultry waste export, incentivized the reduction of nonpoint source loading from pasture lands and septic systems, and worked with hundreds of landowners in the IRW, these efforts could not reduce phosphorus loading, because legacy phosphorus was too excessive and/or continued applications of phosphorus overwhelmed the benefits of the ongoing conservation.
2. Although many of the main stem Illinois River and Flint Creek subwatersheds of the basin receive point source discharges, most of the small

subwatersheds receive nonpoint source loadings exclusively. As evidenced by raw water quality data and supported in the most recent Oklahoma and Arkansas watershed models referenced above, many non-urban subwatersheds contribute significantly to phosphorus loading (Figure 14). Although some subwatersheds which contain urban areas of the watershed are ranked amongst the most significant contributors, these are recognized in both models as also containing significant pasture areas receiving poultry waste.

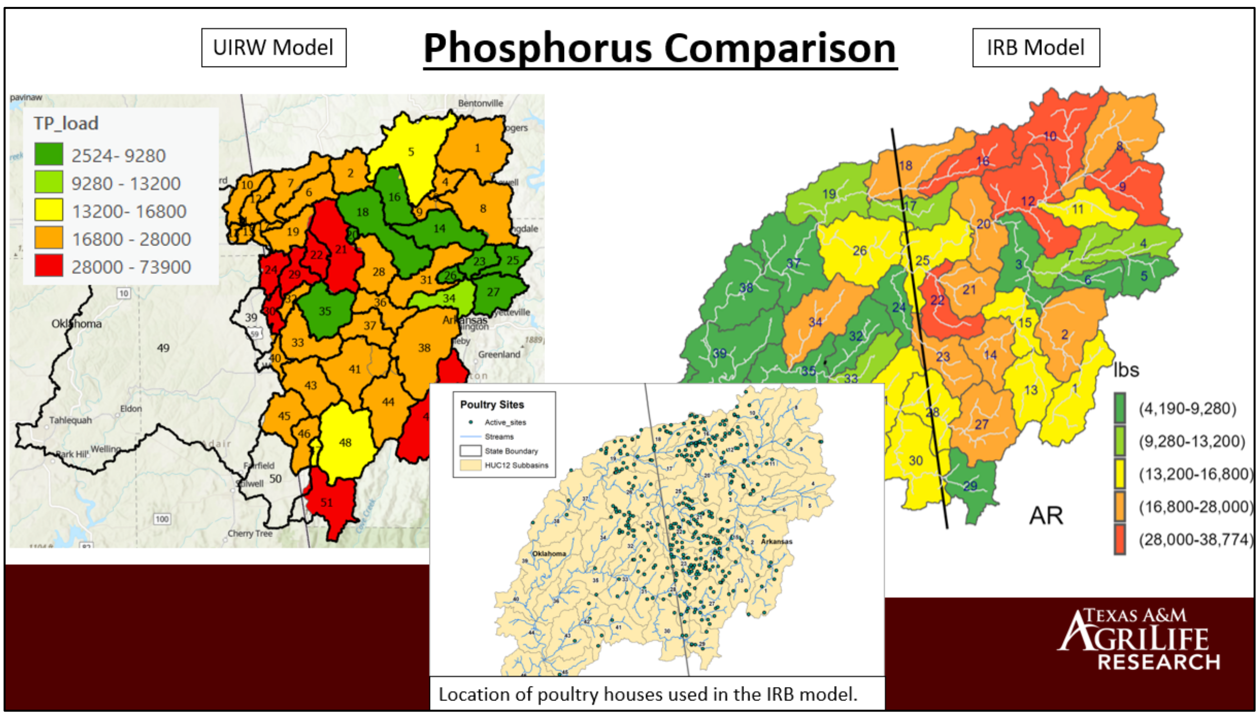


Figure 14. Arkansas and Oklahoma SWAT model depictions of subwatersheds contributing most significantly to TP loading (TX A&M 2024).

3. Total phosphorus concentrations in the Illinois River have not declined since 2009, nor have they declined in the Eucha/Spavinaw Watershed, a neighboring watershed with similar rural land use where a lawsuit settlement resulted essentially in better monitoring for implementation of rules for nutrient management planning and poultry waste application. Just like the Illinois River, land application of poultry waste in the Eucha/Spavinaw

watershed has been a significant source of legacy and current phosphorus loading. However, just enforcing the current Oklahoma nutrient management planning rules in the Eucha/Spavinaw watershed since the settlement in 2003 has not resulted in reduced phosphorus loading to Eucha/Spavinaw. Both Eucha and Spanvinaw lakes remain on the 303(d) list for phosphorus (ODEQ 2022) and phosphorus data downloaded from the USGS demonstrates that phosphorus concentrations in Spavinaw Creek (primary tributary to Lakes Eucha and Spavinaw) have not changed since the implementation of the lawsuit settlement (Figure 15). This suggests that an upper threshold of 300 lbs P/acre of soil test phosphorus is not protective.

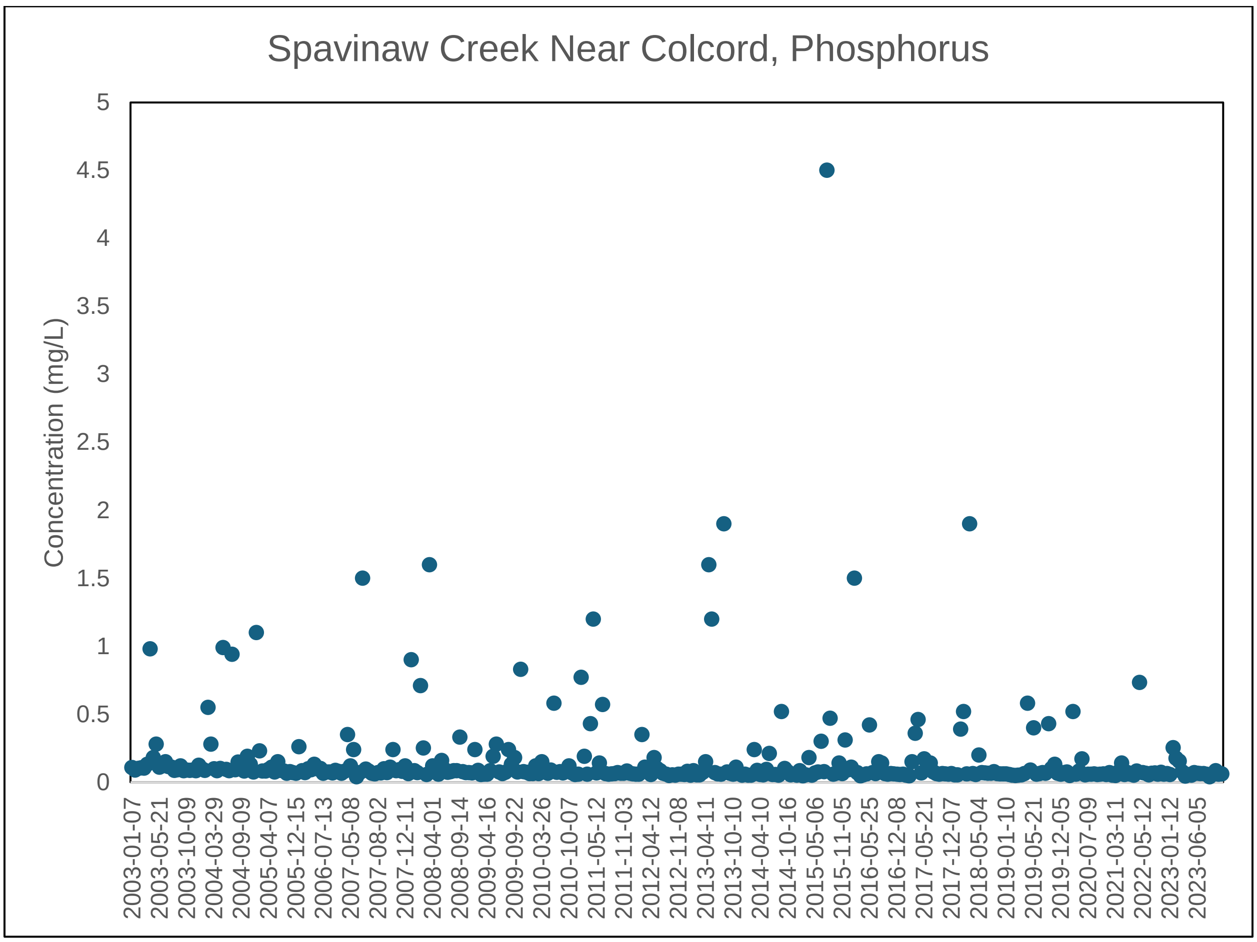


Figure 15. Total phosphorus in Spavinaw Creek (Eucha/Spavinaw Watershed) near Colcord, Oklahoma. Data sourced from USGS.

4. Finally, as referenced above by data provided in the Arkansas River Compact Commission Reports, which indicate non-urban sourced nonpoint source TP loading as the dominant source contributing to phosphorus loading in the IRW and continued listing of stream and lake segments on the 303(d) list for phosphorus suggests that poultry waste applications remain as a significant source of phosphorus and that poultry waste adversely impacts water quality in the basin.

VIII. SEVERAL PROGRAMS HAVE ATTEMPTED TO ADDRESS THE PHOSPHORUS POLLUTION PROBLEM, YET THE POLLUTION REMAINS.

As referenced above, at least $56 million state, federal, and local landowner dollars have been invested in conservation projects in rural and urban areas of the watershed since the trial (These numbers don't include all Arkansas, USDA, or tribal dollars are likely a conservative estimate). Despite extensive work, partnering with cities, towns, conservation districts, landowners, tribes and others, water quality has not improved. Examples of these projects include:

1. Riparian Area Projects- Since 2009, OCC, in partnership with landowners, conservation districts, Grand River Dam Authority (GRDA), and the USDA Farm Services agency have implemented long-term riparian conservation programs on approximately 3,809.4 acres (2,708 acres of remain in active contracts), investing at least $5.4 million. Figure 16 depicts current and historic riparian easements in the IRW in Oklahoma. Those shaded in purple are 10-15-year easements funded through the Conservation Reserve Enhancement Program or complementary EPA 319 Project funding in partnership with Conservation Districts. Those shaded in red are funded in partnership with GRDA (primarily using EPA 319 and matching state funds). All easements noted in red were funded after 2009. Easements noted in orange were enrolled by the Oklahoma Scenic Rivers Commission prior to

2007 but are still active using funding from EPA 319 ($514,325) and donations from the poultry integrators (approximately. $151,592). Although not pictured, Arkansas has implemented a similar effort of riparian protection with additional focus on streambank stabilization and restoration, utilizing state and federal funding that has resulted in more than 21 miles of riparian protection. Both programs have more landowners willing to participate than they have funds available to enroll cooperators.

2. Projects Prioritizing Streambank Stabilization. Oklahoma has also invested EPA CWSRF and ODOT state funds in streambank stabilization projects totaling approximately $3.4 million. Additional state, federal and even private mitigation funding has been invested in Arkansas for similar projects, much of which is not included in the $56 million dollar figure mentioned earlier.

3. Septic Tank Projects. Since 2009, OCC, districts and landowners have replaced 99 failing septic systems in the Oklahoma portion of the IRW utilizing $412,000 EPA 319 and state funds. Similarly, Arkansas invested $1.28 million to replace failing septic systems in the Arkansas portion of the watershed.

4. Additional conservation practices also included in the $56 million figure referenced earlier and installed in the Oklahoma portion of the IRW through state cost-share, NRCS, or OCC Nonpoint Source programs include:

Practice Name	**Amount Installed**	**Units**	**Practice Name**	**Amount Installed**	**Units**
Forage harvest management	7,604	acres	Forage and biomass planting	10,209	acres
Nutrient management	25304	acres	Poultry waste transfer	49,632	tons
Comprehensive nutrient management plan	71	plans	Waste storage facility/lagoons/composters	91	units
Fence	913,826	feet	Pond cleanouts	50	ponds
Watering facility	662		Ponds	357	ponds
Water well	149	wells	Prescribed grazing	57,495	acres

Critical area planting	19	acres	Wetland restoration	48	acres
Conservation cover	All NRCS 129	acres	Prescribed burning	7,536	acres
Heavy use area protection	288	units	Pasture and hay land planting	288	acres
Livestock water pipeline	30,178	feet			

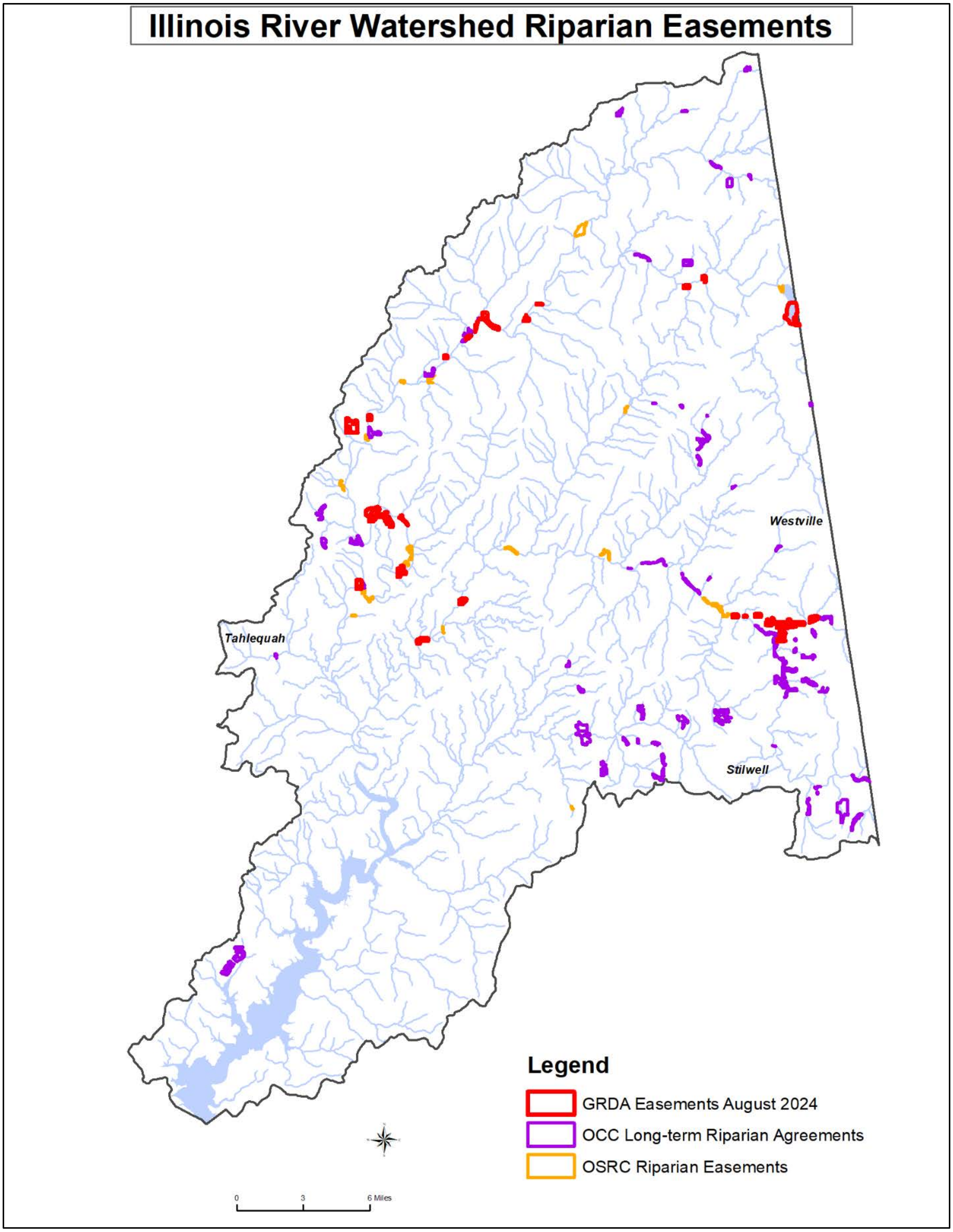


Figure 16. Riparian Easements in the IRW.

IX. PROGRAMS AND PRINCIPLES THAT MIGHT HELP DECREASE THE POLLUTION AND MAKE THE IRW CLEANER

Most nonpoint source projects include a water quality monitoring or modeling component to track or predict impacts of projects. Although some projects have measured relative benefits in subwatersheds during the time period in which projects were in effect, none of these nonpoint source project benefits include decreased total phosphorus concentration or loadings that are discernable at the larger watershed scale. USDA NRCS has engaged in a long-term program to measure and improve efficiency of conservation practice implementation, the Conservation Effects Assessment Project (CEAP) (https://www.nrcs.usda.gov/ceap). CEAP coordinates environmental monitoring on conservation projects across to ascertain the most efficient mechanisms to address a variety of natural resource concerns. In a national webinar, USDA CEAP researchers presented the results and lessons learned from recent efforts to address legacy phosphorus on August 22, 2024 (USDA 2024). As it relates to legacy phosphorus, and nutrient management, CEAP and USDA recommend three concurrent actions, referenced by the acronym "ACT," necessary to address legacy phosphorus:

1. **A**void legacy P accumulation- lower nutrient additions by tailoring nutrient application to crop need for that nutrient, using the right method of application, and avoiding application in critical source areas most susceptible to nutrient loss. Increase nutrient removal from the system by implementation of management systems that seek to "mine" the excess nutrient and export from the watershed of concern
2. **C**ontrol phosphorus mobility in the system by practicing conservation practices that will reduce its mobility to downstream waterbodies
3. **T**rap legacy phosphorus that overwhelms control practices.

When these three concepts were implemented concurrently in the Lake Champlain watershed in Vermont which has been impacted by legacy phosphorus from long-

term dairy waste land application, CEAP researchers found that phosphorus in runoff reduced to less than 1 Kilogram per hectare which they reference as a threshold above which water quality problems are more likely downstream. Similar results were achieved when implemented in the Lake Erie basin in Ohio on cropland fields. When only one or two of these concepts were implemented, phosphorus levels did not decline because the effectiveness of one component was overwhelmed by the other(s).

Therefore, to apply these concepts in the Illinois River Basin and limit the impact of historical, current, and future poultry waste application on downstream waterbodies you first must limit over application to the agronomic rate for phosphorus. A soil test phosphorus of 65 pounds of soluble reactive phosphorus per acre more than meets the needs of Bermuda grass which is the predominant crop grown in the IRW. Phosphorus application should be prohibited from exceeding 65 pounds per acre (lbs/ac), which is recognized as Oklahoma's agronomic level for phosphorus or the soil phosphorus concentration which Oklahoma standards recognize is sufficient for optimal growth of any potential crop produced in the state (Zhang and McCray 2018). NRCS recognized this level of 65 lbs/ac as the agronomic rate in its nutrient management practice standard (code 590). Setting the upper threshold for of soil test phosphorus at the agronomic rate would significantly reduce the accumulation of phosphorus in soils while still allowing ranchers to grow healthy pastures for their cattle. Rutgers University recommended that 50 lbs of phosphate (P_2O_5) was adequate to grow most grass hays (Heckman 2018). Texas A&M found that most grasses require 42 – 80 lbs/acre, depending on forage production goals, soils and rainfall (TX A&M 2024).

Voluntary programs should be considered that incentivized hay production and export from the IRW as a method to "mine" the legacy phosphorus from soils while still providing profit potential for agricultural producers. These programs would require changes to nutrient management plans, redirection of the training about nutrient management planning in the watershed to focus on phosphorus and not nitrogen, education about impacts to soil health and long-term fertility from over-

application of phosphorus, trackable soil sampling which could be used to ascertain whether management strategies were effective at mitigating soil phosphorus accumulation, and likely incentive programs (and management of such) to modify current operations. Recent workshops focusing on regenerative management which balance limited supplemental fertilizer input with better utilization of available grass to build soil resources were well-attended in the region and multiple producers from the watershed have indicated that they are interested in participating in regenerative management programs (if funding were available) to help adopt this improved nutrient management strategies.

Second, conservation programs should continue to emphasize well managed grazing, field borders, livestock exclusion from streams, cover crops and other practices that build soil health, and reduce both the volume of runoff and the amount of nutrients and other pollutants in water that does runoff.

And third, to limit the impact of historical, current, and future poultry waste application in the IRW, conservation practices should be implemented that trap phosphorus in place including riparian buffers, edge of field wetlands, field borders, bioretention cells, and other conservation practices that trap phosphorus in runoff before it reaches downstream waterbodies.

Many partners in the IRW have worked for decades to implement the second and third of these components, but without the continued over-application of phosphorus being limited, these efforts have been unsuccessful at stemming phosphorus pollution in the watershed.

CONCLUSION

The environmental situation in the IRW has not materially changed since the conclusion of trial in 2010. Excessive phosphorus is still a serious problem. Proper remedial measures as discussed herein, particularly a cessation in land application of

poultry waste coupled with measures that would trap phosphorus in the land, would eventually improve the water quality in the IRW and Lake Tenkiller.

Signed this 18 day of November, 2024

Digitally signed by Shanon Phillips
DN: cn=Shanon Phillips, o=Oklahoma Conservation Commission, ou=Water Quality Division, email=shanon.phillips@conservation.ok.gov, c=US
Date: 2024.11.18 15:01:10 -06'00'

Shanon Phillips

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Shanon Phillips

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Education

30+ hours post-graduate work towards PhD in Zoology with emphasis on aquatic resources and groundwater

Master of Science in Zoology
Oklahoma State University, Stillwater, OK May 1995
Thesis: *The Relationship Between Nutrient Limitation and Phytoplankton Community Structure in Tenkiller Ferry Lake*

Bachelor of Science in Biology/Pre-Veterinary Medicine
Kansas State University, Manhattan, Kansas, May 1990

Shawnee Mission East High School, Mission, Kansas- May 1986

Experience

<u>Director- Water Quality Division- Oklahoma Conservation Commission, Oklahoma City, (Acting January 2009 – April 2009), April 2009 - present.</u>

- The purpose of this position is to direct the staff of the OCC's Water Quality Division in the implementation of its nonpoint source pollution program, which includes activities completed under the EPA Clean Water Act Section 319 Program, the State's Wetland Program, USDA Conservation Reserve Enhancement Program, the Blue Thumb Program, and the State's Soil Health and Carbon Sequestration Verification Programs.
- Responsible for coordination of a staff of more than 30 who conduct statewide and watershed-specific monitoring, education, implementation, and water quality planning programs.
- Directs the coordinated development and presentation of program goals, budgets, activities, and results to federal partners such as the EPA and NRCS, Conservation Commission Commissioners and other Commission Staff, legislators, state agency partners, and most importantly, to local Conservation District partners and local communities.
- Assists the Conservation Commission and Conservation Districts across the State with their mission to protect, conserve, and restore Oklahoma's natural resources
- Serves as the agency's principal spokesperson on water quality issues, policies and programs

<u>Assistant Director-Water Quality Division-</u> Oklahoma Conservation Commission, Oklahoma City, March 2006 – January 2009.

- The purpose of this position is to provide assistance to the Director of the OCC's Water Quality Program, including supervision of staff, program planning, representation of the program at meetings, and review and coordination with other federal, state, and local water quality programs.
- Responsible for developing Clean Water Act Section 319 workplans and other proposals such as Conservation Reserve Enhancement Program applications. As the author of these proposals, was responsible for keeping the director, cost-share and finance director, and other staff informed about the intricacies of said workplans including proposed budgets, tasks, and timelines.
- Direct supervision of the writing staff, data manager, cost-share and finance director, wetlands coordinator, and Blue Thumb staff

<u>Senior Technical Writer/Quality Assurance Officer</u>- Oklahoma Conservation Commission, Oklahoma City, OK. May 2001 – March 2006.

- The purpose of this position is to oversee all technical writing aspects of the OCC's Water Quality Program, including supervision of other technical writers. The position is also responsible for all quality assurance activities of OCCWQ.
- Establish guidelines to be followed in the preparation and presentations of reports, including internal review of all documents prepared by the OCC and contractors of the OCC.

- Write and direct the writing of proposals, work programs, final reports, monthly, semi-annual, and annual reports committed to by the OCC- this work included planning staff levels, program budgeting, tasks, milestones an outputs for the annual approximately $6 million program.
- Write or direct the writing of Watershed Based Planning documents to meet EPA guidance
- Establish timelines for preparation of reports based on commitments detailed in various EPA/OCC work programs
- Quality Assurance Officer
  - Write or direct the writing of the OCC's Quality Assurance Project Plans, Quality Management Plan, and Quality Assurance Annual Report
  - Oversee Quality assurance/quality control activities outlined in the Quality Management Program and the Quality Assurance Plans
  - Oversee the implementation of quality assurance audits of office, field, and contractor's staff to insure the validity of the data being collected
  - Participate in the review and interpretation of monitoring data collected by the OCC, contractors, or others
- Represent the agency and/or State programs at numerous national, State, and local meetings, workshops, etc. to report on OCC and/or State activities and to bring back new ideas to apply to OCC programs
- Write or direct the writing of Oklahoma's Nonpoint Source Management Program and Nonpoint Source Assessment Report. This includes being the primary contact with other agencies in securing information necessary to complete the writing of the documents
- Work with conservation districts in the development of local water quality programs
- Review other agency programs and outputs for technical merit, accuracy, and to insure coordination with OCC and Nonpoint Source Program activities and goals
- Supervises a staff of 3 – 4 writers and the Data Manager

<u>Technical Writer</u>- Oklahoma Conservation Commission, Oklahoma City, OK. June 1997 to April 2001.

- Plans hydrologic/environmental studies of water resources systems. Studies are mainly funded out of §319 of the Clean Water Act, dealing with assessment and reduction of Nonpoint Source Pollution. Develops Clean Water Act - required reports and quality assurance and quality management plans.
- Analyzes environmental data from streams and rivers to support hydrologic and/or biologic studies.
- Organizes and prepares technical reports on studies to evaluate chemical and biological characteristics of water resources and relevant research; prepares technical plans and applications for major federal environmental grants.
- Develops recommended implementation plans to protect water resources from impacts of nonpoint source pollution and presents these plans to Federal, State, and Local-interested parties.
- Works closely with EPA Region VI and other State and Federal Agencies to develop policies and plans regarding water resources of the State of Oklahoma (i.e. water quality standards, standard operating procedures, federal and state lists and reports of waters, etc.)
- Reviews OCC, contractors, and other agency documents for technical accuracy and to insure coordination of OCC programs with other federal and State programs.

<u>Carl Albert Executive Fellow</u>- Oklahoma Water Resources Board, Oklahoma City, OK June 1995 – May 1997.

- Plans and performs hydrologic/environmental studies of water resources systems. Reviews published literature and ongoing work to augment study design and procedures. Makes presentations regarding results and recommendations.
- Collects and analyzes environmental data from streams and lakes to support hydrologic and/or biologic studies. Applies field data to computer models to assist with the formulation of recommendations for protection of water quality, management and restoration, including TMDL development.
- Organizes and prepares technical reports on studies to evaluate chemical and biological characteristics of water resources and relevant research; prepares technical plans and applications for major federal environmental grants.
- Supervises summer/temporary employees assisting with data collection and analysis.

<u>Research Associate</u> - Water Quality Research Lab, Oklahoma State
University, Stillwater, Oklahoma, May 1992 - May 1995.

Knowledge and Skills

- Understanding of the Federal Water Quality related programs, particularly Clean Water Act
- Understanding of Federal and State Nonpoint Programs, including EPA Guidance
- Aquatic ecology and NPS pollution
- Relationships between soil health and downstream water quality
- Knowledge and use of nutrient management planning tools
- Training and experience using a wide variety of water quality and NPS-related computer models and GIS analysis including ARCMAP, SWAT/HAWQS, BATHTUB, PreDICT, STEPL, BASINS, COMET and other programs to complete tasks ranging from basin mapping and landuse analysis to estimating loading reductions due to implementation of BMPs.
- Watershed Based Plan Development
- Knowledge and use of State Water Quality Standards
- Knowledge of the relationship between and roles of the Conservation Districts, state agencies, NRCS, and FSA
- Experience in personnel management, program management, and program planning and budgeting
- Completed 300 of 300 hours toward Certified Public Manager Program through the office of personnel management.

Memberships and Participation

- Oklahoma Clean Lakes and Watersheds Association- Board member since 1996
- Keep Oklahoma Beautiful- Board member 2015-2019
- Illinois River Watershed Partnership- Board member since 2021
- Oklahoma State University Environmental Sciences Graduate School Program Review Committee- 2022 – present
- Scenic Rivers Joint Study Committee Member- 2013 - 2016

References

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